Laboratory Equipment Manufacturer
www.mrclab.com

Operation Manual for
Infrared Cameras
IR-CAM-B-70/I-75/B-90/I-95

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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MRC.VER.01-3.12

To Our Customer

Dear Customer:

Thank you for choosing this Infrared Camera!

Please read this user manual carefully before first use. Also please keep in a safe place for reference in the future.

Please operate with the recommended instructions in user manual.

We reserve the right to change this user manual without further notice.

⚠ WARNING

DO NOT OPEN OR EXCHANGE PARTS!
REPAIR ONLY CAN BE CONDUCTED BY STUFF!

NOTICE

- In order not to cause malfunction or even damage the device please do not direct the lens towards strong high-temperature radiation source (such as the sun) whether the power is on or off!
- Avoid violent shock and impact during operation or transport.
- Storage temperature is between -40OC and 60OC. The device must be kept in original packing case during transport.
- Typical storage place is cool, dry, ventilated, and without strong electromagnetic field.
- Keep the lens surface off grease or any chemical substance which would damage the lens. Close the lid after operation.
- Please regularly backup data on PC to prevent potential data loss and format the internal FLASH memory duly to make it operate properly.

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1. Product Summary

The Infrared Camera (equipped with Uncooled Focal Plane Array Micro-bolometer) produces crisp thermal image and accurate temperature reading to help increase system maintenance quality and efficiency in many industries. The Infrared Camera is packed with advance features, such as colored thermal images, multi-measurement methods, real-time video, voice annotation, sound and color alarm, IR fusion, Built-in flash and SD card storages.

Typical Application:

- **Power Industry:** Monitor and diagnose the condition of electrical wire and equipment, detect power leak, and prevent system malfunction.
- **Petrochemical Industry:** oil pipeline check, material interface detect, heat leakage, insulation structure and power equipment detect.
- **Fire Protection:** forest fire protection and latent fire source search, self-ignition prevention and detection of special material, electric fire precaution detect.
- **Medical Application:** Accurately measure human body temperature and analyze temperature field distribution.
- **Building Industry:** humidity, air leakage and insulation defects detect.
- **Other Applications:** Civil engineering, scientific research, and railway etc

1.1 Standard Item List

The infrared camera comes with the following standard items and accessories:

Name	Quantity
Infrared Camera	1 SET
Li-Ion Battery	2 PCS
Charger	1 PC
SD Card	1 PC
SD Card Reader	1 PC
USB Cable	1 PC
Video Cable	1 PC
Converter cable	1 pc
User Manual	1 PC
IRSee Software CD	1 PC
Adapter	1 PC
Transport Case	1 PC

1.2 Optional Item List

- □ Wide-angle lens
- □ Telephoto lens

2. Battery and Charger

It is recommended to charge battery immediately when device indicates low power, please read more about battery installation and removal methods on Page 8.

Device comes with two sets of Li-Ion battery and one battery charger. It is strongly recommended to operate only with the included battery and charger. Use any other brand charger or Li-Ion battery may cause fire or critical damage.

2.1 Charging Battery

- Align the notch of the battery at the charger's mount, press the battery downward gently along the triangular arrow, and fit it to the end.
- Connect the charger to an AC outlet, during charging, the red LED will be on, and when charging is completed, the green LED will be on instead.

📖: It is about 4 hour s to completely charge one battery.

2.2 Direct Charging

It is available to charge the built-in battery with the adapter; it is about 5 hours to fully charge a run-out battery. The indicator indicates orange in charging and remains green when fully charged.

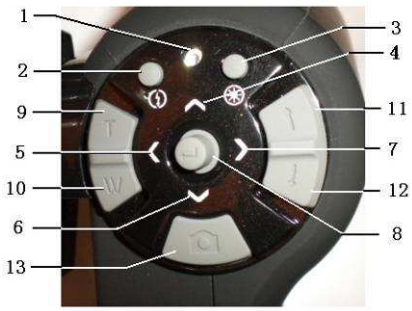
2.3 Attention for Using Battery Charger

- Battery Charging can only be conducted inside of a house.
- Do not short-circuit the battery.
- Do not put the battery in high temperature environment (≥60OC). Never disassemble the battery or put it into fire, which may cause explosion.
- Do not try to modify the battery or the charger.
- Li-Ion battery has no memory effect, charging can be conducted at any time.
- Please remove the charger from AD socket as soon as charging is completed.

3. Panel Function Summary

In this manual, "long press" means Long press button down for about 2 seconds, and "press" or "short press" means press and release.

3.1 Main Control Panel



1. Power LED Light

After infrared camera is turned on, the indicator functions as a power indicator in green; functions as a charging indicator in orange, indicating the battery is being charged now.

2. HotKey button 1

Press to automatically focus, and Long press to turn on / off LED light.

3. HotKey button 2

Press to switch between measured objects (point, line and area), and fusion zone, setting range of thermal superposing temperature, color code, temperature upper and lower limits; and Long press to turn on / off the laser.

4, 5, 6,7 Direction buttons

Up (^), Down (v), Left (<), and Right (>) keys have different usages in different modes.

In main menu, direction buttons are used for moving selected items or changing slide-bar value. In real time Infrared view mode, directions buttons provide one-click access.

In Fusion or Superpose imaging mode, press Right (>) to make better overlaying between visual and infrared images.

Press Left (<) and Right (>) to select preview images.

Press Left (<) to freeze Infrared image and press again to unfreeze.

Press Up (^), or Down (v) to switch between normal view and 1-8x zoom continuous

After press Hotkey button 2 in area measure(in yellow flashing) :

- Select measured spots: press Up (^), Down (v), Left (<), and Right (>) button to move the spot in the same direction.
- Select the measure line and sampling line; press Up (^), Down (v), Left (<), and Right (>) button to move the line in the same direction.

- Select area box: in **move** menu, press Up (^), Down (v), Left (<), and Right (>) buttons to move area box, and in **size** menu, press Up (^) and Down (v) to resize the vertical direction area box, press Left (<) and Right (>) buttons to resize horizontal area box.
- Select Fusion area: in fusion imaging mode, press Up (^), Down (v), Left (<), and Right (>) buttons to move infrared image area at same direction; press Up (^), Down (v) buttons to resize vertical fusion area; and press Left (<) and Right (>) buttons to resize horizontal fusion area.
- Select and set thermal superposing temperature range: in thermal superposing imaging mode, press Up (^) and Down (v) buttons to select slide-bar, and press the Left (<) and Right (>) keys to set the superposing temperature upper or lower limit, as well as the temperature values above or below the superposing temperature.

- Select Color Palette or temperature measurement limit: Press Left (<) and Right (>) to change Color Palette; and Press Up (^) and Down (v) buttons to change temperature limit.

8. ↵ (Menu / Enter) button

This button has different functions under different conditions:

1).In real time Infrared view mode, press this button to open the main menu.

2).In the menu mode, press the key to confirm operation.

3).In real time Infrared view mode, long press this button to manually rectify measurement result, LCD screen will display the word “rectifying.”

4).In image viewing mode, long press this button to exit.

📖：After auto rectifying, if device has abnormal noise, long press ↵ button to perform manual rectifying usually solves such issues.

9, 10, Manual Focus (T / W) button

Press T/W button to manually focus to get better thermal image when auto-focus thermal image is not good enough.

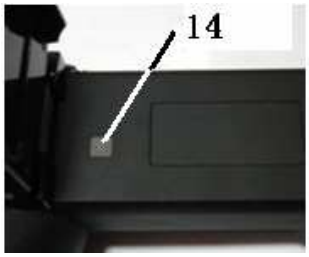
11, 12, CW / CCW imaging mode switch

Press the button to switch image models among infrared, visible, fusion, superpose, and picture in picture (P-I-P).

13. Shutter key

Press the button to save the current image.

3.2 Side View



14. Power ON/OFF button

Long press this button to power on/ off the device.

15. Multifunctional interface for audio output or video output

Please insert converter cable. It can be connected to headphones to listen the playback audio notes as analog audio output interface; It can be connected to the monitor to play videos as a video output interface.

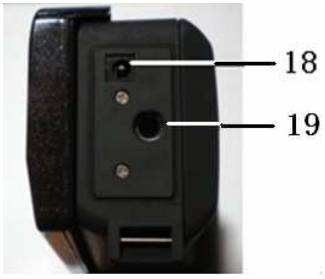
16. SD card interface

MICRO 2G SD card can be inserted into the interface to expand storage volume.

17. USB Interface

Standard USB interface can be connected to the computer for data transmission.

3.3 Bottom View



18. External DC In
External DC requirement is DC 5V.
19. Screw nut on tripod
Size of screw nut on tripod 1/4” _20.

3.4 Left Side View

20. 3.2" Color 270°tiltable LCD

4. Quick Start Reference

4.1 Battery Setting

Insert and move in the lithium battery as indicated direction, user can easily insert and move the battery.

Battery Installation

Battery Removal

4.2 Quick Operations

- Insert the battery correctly.
- Long press Power button until the LED light is on, and wait until system finishes initialization.
- Slide IR Lens lid down, point to target, and adjust focus to get crisp thermal image.
- Long press the ↵ **button** to rectify thermal image.

4.3 Measure Target Temperature

- Point device to measurement target, and press HotKey button 1 to auto-focus. On the upper-right LCD corner, ⊣⊢*=×× displays the spot measurement result. For better accuracy, long press ↵ button to perform manual rectify.
- Select Area (Rect) Measurement to measure max, min, and average temperature within a rectangle box.
- It is recommended to press ❮ button to freeze thermal image first, and then apply different and detailed analysis. Press ❮ button one more time to unfreeze.
- When measure result is outside standard temperature range, screen display changes to indicate either below or above temperature range. E.g.: ***175/395 is with -20 ~ 250 ℃, then the Camera Will Display> 250.0 ℃ or <-20.0 ℃ to Prompt Users.***

4.4 Infrared Image and Voice Annotation

- Each thermal image can save up to 40 seconds voice annotation data. Image and voice annotation can later be reviewed on PC by bundled IRSee software. To save infrared image, press the **Shutter** button while accessing the target image, then a "**Voice**" dialog box appears, select "**Cancel**", then press the **Enter** key, the image file has been saved; select the "**Record**", then press the **Enter** key, both image and voice files have been saved.
- In main menu, press the **Enter** key to File → Save provides the same function.

. : Select Cancel during voice recording to exit.

4.5 Infrared Image Playback

- Press the **Enter** button to enter the main menu.
- Select the **Main Menu** → **File** → **Manage**, and then select the **file directory** and **file name**, the thumbnail image of the stored image is displayed, then press the **Enter** button to enter the viewing state.
- When viewing thermal image, press the Left (❮) or Right (❯) button to switch thermal image in the same folder.

- The ♪ icon indicates voice annotation attached to current thermal image. Press **Enter** button to enter **File** → **Voice,** then select "**Play**" to play back.
- Long press the **Enter** button to return the real-time imaging mode.

4.6 Telephoto and Wide-angle lens

- The device can be equipped with telephoto lens or wide-angle lens. Put lens in accord with the dots (Figure 1) in line, then turn lens in clockwise direction till to the two dots in line (Figure 2).

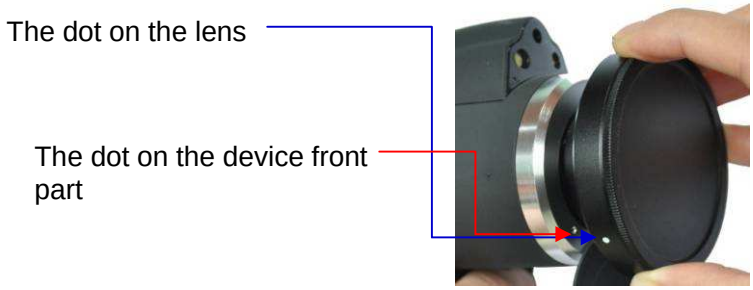


Figure 1

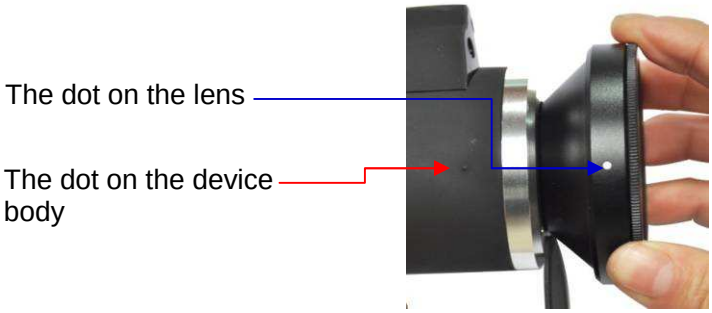


Figure 2

- **Enter** →**Image**→ **Analysis Setting** →**IR Lens** menu, press the ❮ or ❯ button to adjust the corresponding lens.

- Operate Image Save and Image Playback according to the steps mentioned in **4.4** and **4.5** here in above.

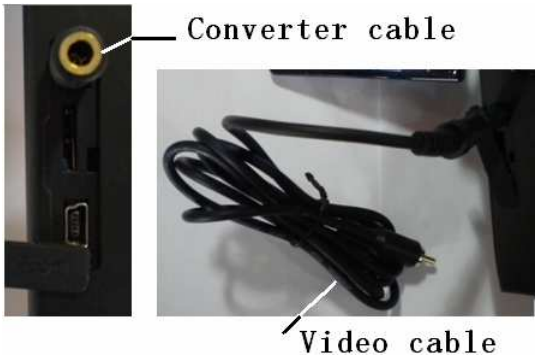
4.7 Connect to PC

Connect device to PC using included USB cable. it's available to to export, delete, and format the data saved in the built-in FLASH memory or on the SD card.

4.8 Video and Audio output

- Insert Converter cable to Multifunctional interface for audio output or video output, connect Monitor to Converter cable using Video cable, Enter → **Setup** → **System Setup** → **Display Device**,

  Press the Left (<) or Right (>) to switch to **Monitor** in the **Display Device**, then get thermal image in the Monitor.



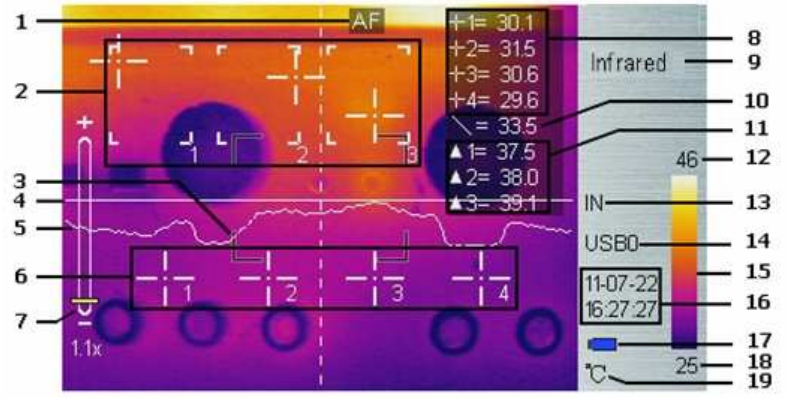
- Insert Converter cable to Multifunctional interface for audio output or video output, then insert Common earphone to Converter cable, finally tune voice annotation according to **4.5**.

5. Operation Menu

5.1 Display Summary

All items can be selected by short pressing HotKey 2 button

(Note: Long press Hotkey 2 button will turn on/off laser sight). The selected item is flashing in yellow color. If no operation in 2 seconds after selection, Hotkey mode will exit automatically.



Real-time Thermal Image Interface

1. **Auto-focus**: Press Hotkey 1 button for auto focus.
2. **Area Measure Box**: 3 areas can be selected in area measure box; enter the **Main Menu** → **Measure** → **Rect** to operate.
3. **AF Area**: objects need focused can be displayed in the area to achieve Auto focusing effect.
4. **Horizontal measuring line**: Horizontal sampling line**,** Enter **the Main Menu** → **Measure** → **Line** to select the function.
5. **Temperature distribution curve**: sample temperature distribution curve of the measure line.
6. **Point measure cursor**: 4 measure points can be selected. Enable the **Main Menu** → **Measure** → **Spot** to operate.
7. **Symbol for 1-8X digital zoom:** display the multiple of digital zoom, under the real-time measurement mode or the preview mode, click the ^ or v key to change infrared images step-by-step in the multiple of 0.1.
8. **Point measure**: ⊣⊢1, ⊣⊢2, ⊣⊢3 and ⊣⊢4 indicates temperature value of point 1, 2, 3 and 4 respectively.

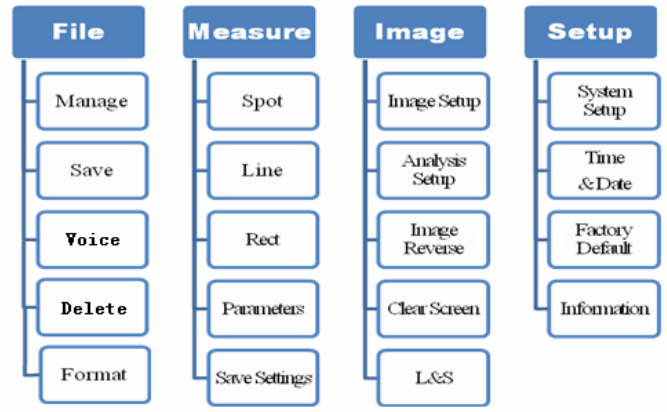
9. **Imaging mode**: Infrared, visual, fusion, PIP, and Superpose can be switched by pressing the ⬆ or ⬇ button.
10. **Line measure**: the temperature value in the crossing of measure line and cursor line.
11. **Area measure**: measure points within the area (maximum, minimum or average temperature is optional)

12,18. Lower or upper limit temperature: the lower and upper limit temperature of the color code at the same time.

13. **Storage medium**: **IN** indicates built-in FLASH, **SD** means SD card; enter **the Main menu → Setup → System Setup → Storage Medium** to adjust the storage medium.
14. **USB symbol**: **USB0** means file transmission, **USB1** means video transmission; enter the **Main menu → Setup → System Setup → USB** to switch.
15. **Color Code**: color palette. Any kind of color code is available in the palette.
16. **Time Display**: it displays the default date and time.
17. **Battery condition**: indicates current battery power condition.
19. **Temperature unit**: there are three options: □、□、K. enter the **Main Menu → Image → Analysis Setup →Temp unit** to switch.

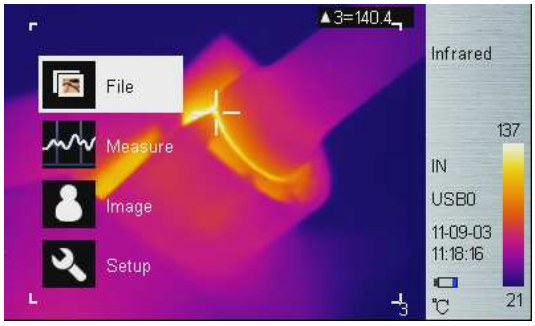
5.2 Main Menu

Menu and sub-menu items:



Enter the Main Menu:

Long press **Enter** button (when not in Hotkey mode) to enter main menu as shown below, not if press Enter button too long, instead of enter main menu, triggers manual rectify.



Main Menu

Using ^ or v button to select menu item, and selected item is highlighted with white background. Press **Enter** or > button to enter sub-menu, press < button to return to the previous menu or exit. (The < key is unavailable to switch under a sub-menu consisting of left or right switchable options).

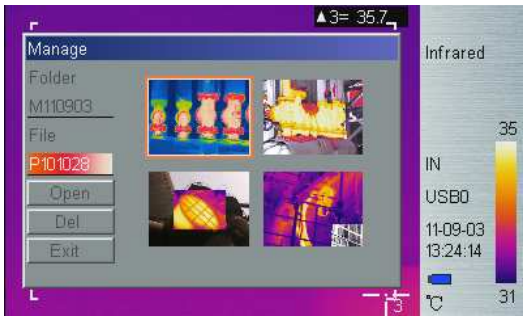
5.2.1 File

Using File menu to save, playback, and delete thermal image, or add voice annotation or format disk.

File Sub-menu

Manage

Select Manage to preview thermal image, add or edit voice annotation, or delete thermal image.



File Manage

Folder is automatically created if not exist when saving thermal image. Folder name is MYYMMDD, and YYMMDD is year, month, and date. For example, Jan 2nd, 2009 folder is M090102. All thermal images taken in this day is saved in this folder. Thermal image file name is Phhmmss, and

hhmmss is hour, minute, second (according to system time). For example, P080502 in folder M090102 means the thermal image taken at 8:05:02 time in Jan 2nd, 2009.

In File Manage window, press ^ and v button to select items. Press < or > button to switch folder or file when highlighted. After selecting thermal image, press **Enter** key to **Open** to view thermal image or press **Enter** key to delete it, and press **Exit** to exit File Manage window.

Thermal Image preview

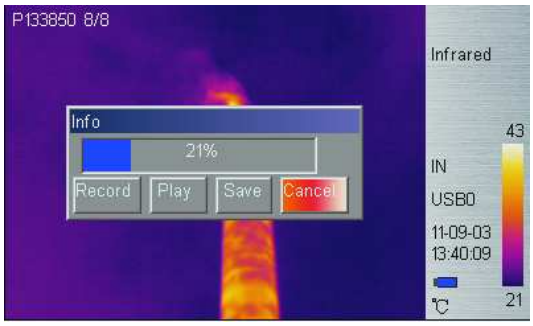
Save

Save real-time thermal image. The operation method is the same as **Shutter** button.

Record & Play

The Voice menu is used for recording, playing back, save and cancel operations.

The ♪ icon indicates voice annotation data with current thermal image. If voice annotation already exists, press **Record** will record new voice annotation and erase previously saved one. Press **Cancel** first to stop recording then press **Save** to save.



Voice Annotation

Delete

Enter the delete menu, a dialog box pops up prompt, select the "**Ok**" option and press the **Enter** key to delete the thermal image.

Delete saved thermal image

Long press the **Enter** key to exit the preview mode.

Format

Format the built-in FLASH or SD card. When Press **Enter** button to **Main Menu → Setup → System Setup → Storage Medium** to select the "Internal", then format the built-in FLASH; to select the "SD" to format the SD card. After the option is selected, a dialog box pops up prompt "whether to format the disk?" press the "**Ok**" option to immediately format saved data, press "**Cancel**" option to exit.

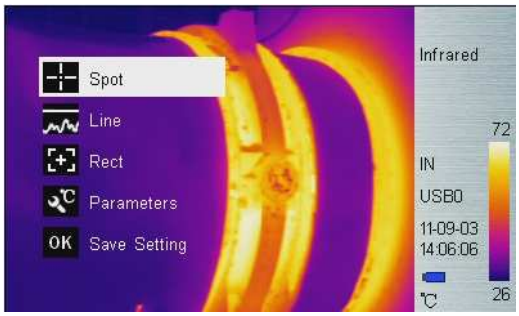
Format saved thermal image

🕮： Once FLASH or SD card is formatted, all saved data will be permanently deleted, please ensure that the data has been transferred to PC before format.

🕮： If the system fails to save images, please search and kill viruses, and if no virus is found, please backup data before formatting.

5.2.2 Measure

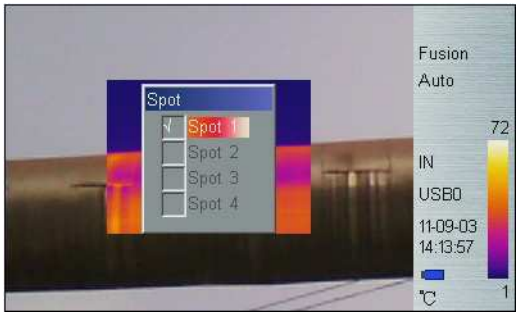
There are 5 items: Spot, Line, Area (Rect), Parameters, and Save Setting in Measure menu.



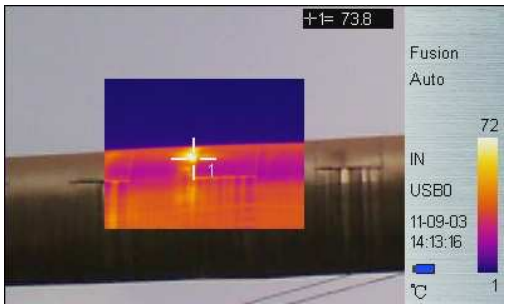
Measure Sub-menu

Spot Measure

Press ❮ or ❯ button to select or deselect. Selected spot is check marked. Up to 4 spots can be selected at the same time.



Spot Target Selection



Spot Measure

Measure result on upper-right LCD corner is temperature reading at location marked with ⊣⊢. Up to 4 spots can be selected.

Spot Measure Attribute

Press Hotkey button 2 until spot marker is flashing in yellow, and then press Up (❮), Down (❯), Left (❮) and Right (❯) buttons to move spot location to different directions, press **Enter** button to enter Attribute Menu to set the emissivity and reference point. After 2 seconds with no operation, system will exit to real time Infrared view screen.

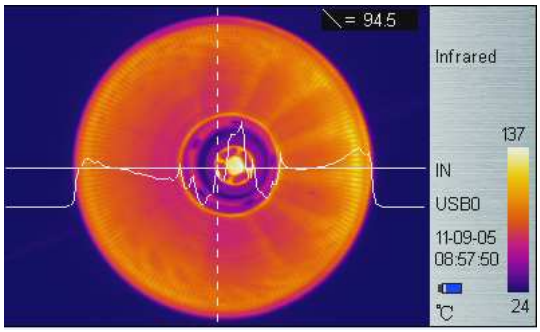
Spot Measure Attribute

Emissivity: Refer to Appendix *Emissivity of raw materials*.
Set Reference: Set current spot as reference point. If selected, all measure result will be relative value to this spot temperature.

Line Measure

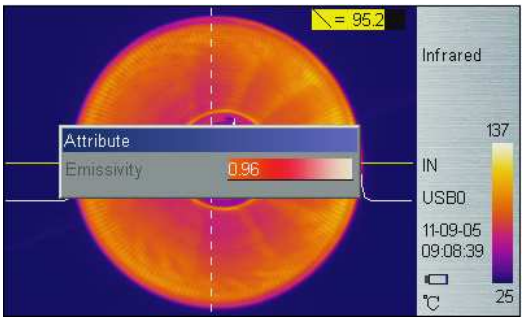
There are 2 line measure options: vertical and horizontal.

Horizontal Line Measure



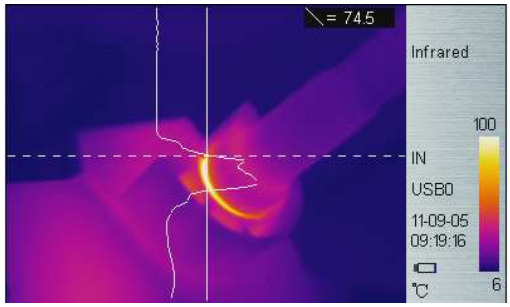
Horizontal Line Measure

Horizontal line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on vertical cursor line intersection. After using HotKey button 2 select line measure, press ^ and ˇbutton to adjust sampling line position, and press < and > button to adjust cursor line position. Press **Enter** button to enter Attribute Menu. After 2 seconds with no operation, system will exit to real time Infrared view screen.



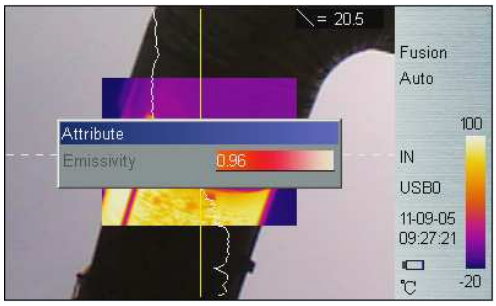
Horizontal Line Measure Attribute

Vertical Line Measure



Vertical Line Measure

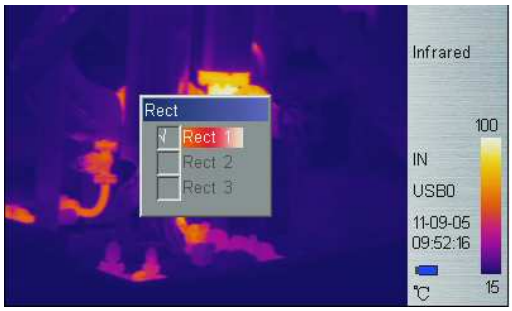
Vertical line is temperature sampling line, and upper-right LCD corner displays temperature measurement reading on horizontal cursor line intersection. After using HotKey button 2 select line measure, press ‹ and › button to adjust sampling line position, and press ^ and ˇ button to adjust cursor line position. Press **Enter** button to enter Attribute Menu. After 2 seconds with no operation, system will exit to real time Infrared view screen.



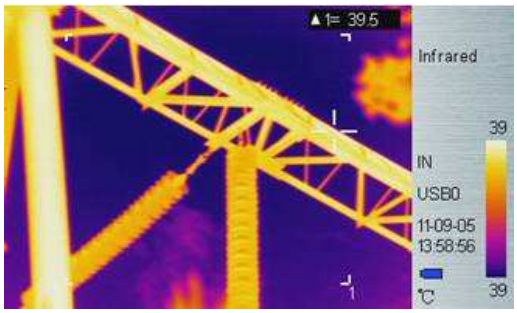
Vertical Line Measure Attribute

Area (Rect) Measure

Press ❮ and ❯ button to select or deselect. Selected Area is check marked. Up to 3 areas can be selected.



Area (Rect) Target Selection

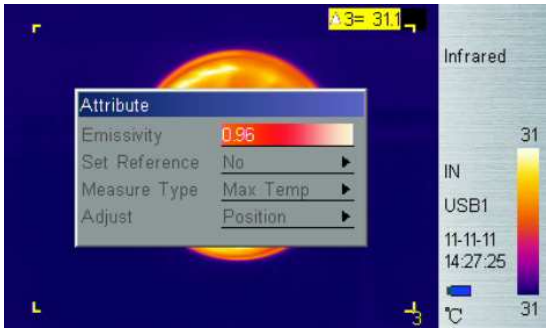


Area (Rect) Measure

Measure result on upper-right LCD corner is the temperature

measurement result within the corresponding rectangle. There are 3 measure types: max, min, and average temperature.

Area (Rect) Measure Attribute
Press the HotKey button 2 until area rectangle is flashing in yellow. Press **Enter** button to enter Attribute Menu in which four parameters can be adjusted namely: emissivity, set reference, measure type, move /size.



Area (Rect) Measure Attribute

Emissivity: Refer to Appendix: *Emissivity of raw materials*.

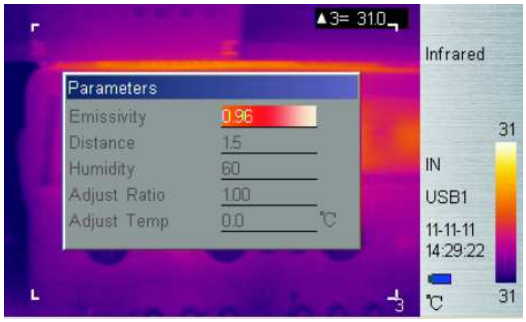
Set Reference: Set current area as reference. If selected, all measure result will be relative value to this temperature.

Measure Type: Select from max, min, and average.

Adjust: Adjust rectangle position and size.

Parameters

Change different settings to adjust temperature measurement accuracy. Press ^ and v button to select different parameters, and press < and > button to change value.



Parameter Sub-menu

Emissivity

Emissivity varies based on target subject material, surface temperature, surface roughness, measurement angle, and etc. Press ❮ or ❯ once to change Emissivity by 0.01. Long press ❮ or ❯ will change Emissivity in 0.1 intervals.

Distance

This value can be omitted if target subject is close to device (less than 10m). Otherwise, set Distance value accordingly to get more accurate temperature reading. Press ❮ or ❯ once to change Distance 0.1m. Long press ❮ or ❯ will change Distance in 1m interval.

Humidity

This value can be omitted if target is close to device (less than 10m). Otherwise, set Humidity value according to environmental condition. Press ❮ or ❯ once to change Humidity 1%. Long press ❮ or ❯ will change Humidity in 10% interval.

Adjust Ratio

Due to long time usage of device, the sensitivity of IR detector may decrease. In such case, it is necessary to adjust ratio value to get more accurate temperature reading. During calibration, if temperature reading is higher than actual target temperature, change ratio value lower, and vise versa. Press ❮ or ❯ once to change ratio value 0.01. Long press ❮ or ❯ will change ratio value in 0.1 intervals.

Adjust Temp

Under certain condition, it is necessary to adjust temperature reading by a

pre-define value. Normally this option should be left unchanged. Press ❮ or ❯ once to change 0.1□. Long press ❮ or ❯ will change this value in 1□ interval.

Save Setting

All parameter changes must be saved before power off device. Otherwise, changes will not be saved for next power on.

5.2.3 Image

There are 5 items: Image Setup, Analysis Setup, Image Reverse, Clear Screen, and L&S (Auto/Manual) in Image Menu.

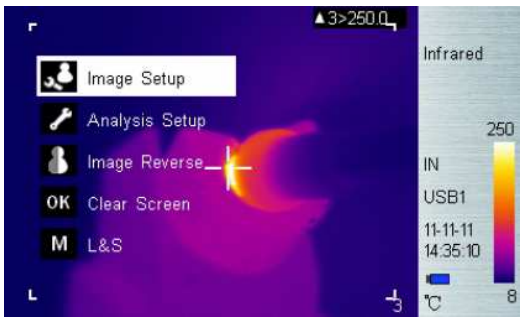


Image sub-menu

Image Setup

Image Setup Sub-menu

Alarm Switch

Press ❮ or ❯ turns on or off the alarm function. If the Alarm Switch is on, when target subject within area box has surface temperature over Alarm Temp, device will alarm with buzzer sound and mark the high temperature location as Alarm Color if Alarm Color is set.

Alarm Temp

When Alarm Switch is off, this option is disabled. When Alarm Switch is on, Alarm Temp is the desired alarm temperature. Press ❮ or ❯ once to change Alarm Temp 0.1□. Long press ❮ or ❯ will change Alarm Temp in 1□ interval. Default setting is 37.0□.

Alarm Color

Alarm Color can select as: Auto, Black, White, Red, Orange, Yellow, Green, Blue, Gray, and Purple. Default setting is Auto, which is no color alarm.

Isotherm Color

When this option is Auto, there is no Isothermal display. Otherwise, target subject Infrared image will change to selected color when temperature is within the range of (Isothermal Temp ± Isothermal Width/2). Default setting is Auto.

Isotherm Temp

Press ❮ or ❯ once to change Isothermal Temp 0.1□. Long press ❮ or ❯ will change Isothermal Temp in 1□ interval.

Isotherm Width

Adjust Isothermal Width to change the range of Isothermal Color display. Press ❮ or ❯ once to change Isothermal Width 0.1□. Long press ❮ or ❯ will change Isothermal Width in 1□ interval. Default setting is 1.0□.

Hot Superposition

Overlay infrared image partly on visual image, which is convenient to identify and analyze infrared image.
There are 3 modes to setup target area to infrared image, the other area to visual image.

Press ❮ or ❯ button to select **Above, Below, Interval** of thermal superposition.

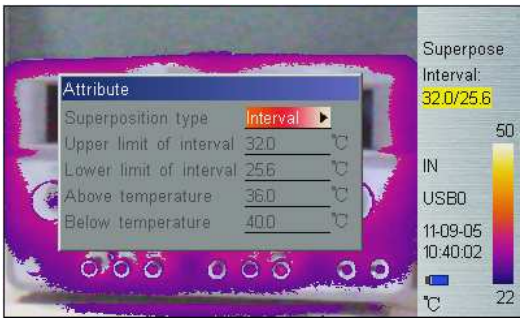
- **Interval**: If select **Interval** type, it is necessary to set the upper limit of interval and lower limit of interval; Press ❮ or ❯ to change 0.1□, Long press ❮ or ❯ to change in 1□ interval.
  Infrared image overlays visual image between two specified temperature.

- **Above**: if select **Above** type, it shall adjust above temperature level; Press ❮ or ❯ to change 0.1□, Long press ❮ or ❯ to change in 1□ interval.
  Infrared image overlays visual image above specified temperature.

- **Below**: If select **Below** type; it shall adjust below temperature level; Press ❮ or ❯ to change 0.1□, Long press ❮ or ❯ to change in 1□ interval.
  Infrared image overlays visual image below specified temperature.

Thermal Superposition Attribute

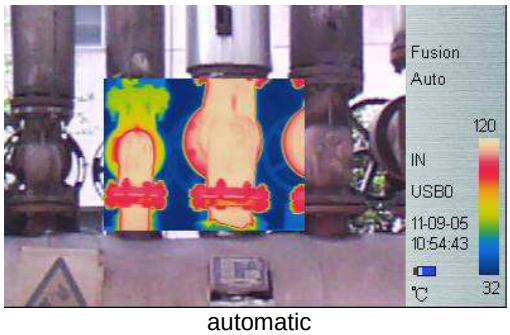
In Superpose mode, Press Hotkey button 2, the interval area is flashing in yellow, then press **Enter** button to pop up dialog box, it is available to adjust **Superposition Type, Upper limit of interval, Lower limit of interval, Above temperature, Below temperature.**



Thermal Superposition Attribute

Fusion

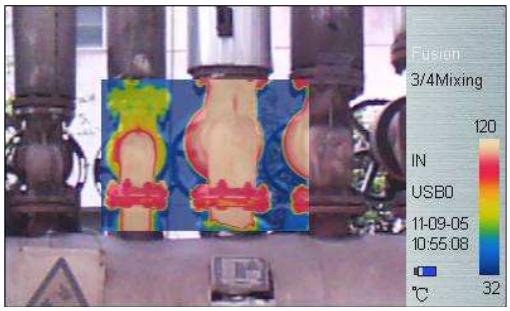
Scaling infrared image overlaying visual image, the fusion has 4 types: **automatic, 1 / 2 Fusion, 1 / 4 Fusion, and 3 / 4 Fusion.**



automatic

1 / 2 fusion

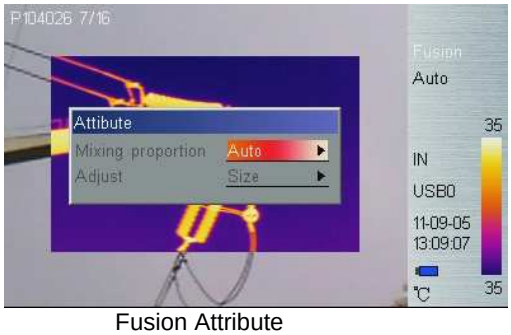
1 / 4 fusion



3 / 4 fusion.

Fusion Attribute

Under thermal fusion mode, press Hotkey button 2 to switch until the word “Fusion” is flashing in yellow, then Press **Enter** button to pop up dialog box,to set Fusion Mixing Ratio, Position / Size. After 2 seconds with no operation, system will exit to real time Infrared view screen.

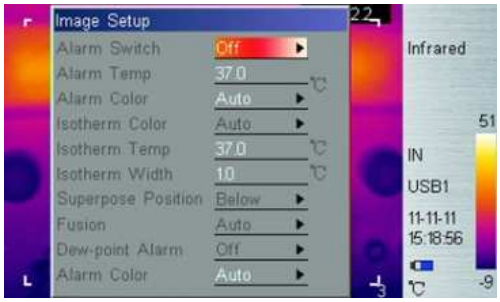


Fusion Attribute

Mixing proportion: press ‹ or › to set Auto, 1/2, 1/4, 3/4 mode.

Adjust: select **Size** to confirm, press ^, v, ‹, › buttons to adjust fusion box’s size; select **Position** to confirm, press ^, v, ‹, › buttons to adjust fusion box’s position. After 2 seconds with no operation, system will exit to real time Infrared view screen.

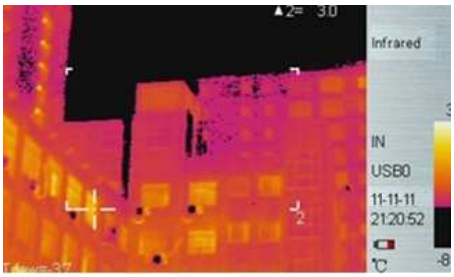
Dew point alarm (available only for 170/390)



Dew point alarm: press ❮ or ❯ button to turn on/off dew point alarm function. If the Alarm Switch is on, manually adjust the current ambient temperature and humidity, the corresponding dew point temperature can be indicated on the lower left corner of screen; if the dew point temperature value exceeds the preset temperature, device will alarm with setting alarm color.

Alarm Color

Alarm Color can select as: Auto, Black, White, Red, Orange, Yellow, Green, Blue, Gray, and Purple. Default setting is Auto, which is no color alarm.



Dew point temperature shown on lower left corner

📖：dew point temperature can be defined as a temperature of air cooled to saturation in the case that both the water vapor content and pressure in air are consistent, which is related to ambient temperature and humidity.

Analysis Setup Sub-menu

Temp Range

Select Temp range base on measure target temperature.
175/395 standard Temp range is -20℃ to 250℃, extra temp range (200℃/600 ℃) or temp range (200℃/1200℃) is customized service.
170/390 temp range is only from -20℃ to 100℃.

IR Lens

For 170/175 infrared camera, there are 3 options: 11mm (standard lens), 5.5mm (wide-angle lens), and 22mm (telephoto lens);
For 390/395 infrared camera, there are 3 options: 21.5mm (standard lens), 11mm (wide-angle lens), and 40mm (telephoto lens).

Press ❮ or ❯ button to select correct IR lens for best measurement result after installing optional IR lens, for example, if remove wide-angle lens / telephoto lens from device, the device is with standard lens, please set “11mm” or “21.5mm”.

⚠ The camera may need 20 seconds to readjust a new lens before it can work properly.

Temp Unit

Press ❮ or ❯ to select Temperature Unit from □, □, and K.
□=9/5*□+32，K=273.15+□

Ambient Temp

For more accurate measure result, set Ambient Temp to correct environmental temperature. Press ❮ or ❯ once to change Ambient

Temp 0.1□. Long press ❮ or ❯ will change Ambient Temp in 1□ interval.

Reference

Set reference spot or area to display measure results as relative value.

Ref Temp

Press ❮ or ❯ once to change Ref Temp 0.1□. Long press ❮ or ❯ will change Ref Temp in 1□ interval. This option is only active when set Ref Temp as reference.

Image Reverse

Press **Enter** button to reverse palette for thermal image display. Press **Enter** again to switch back.

Clear Screen

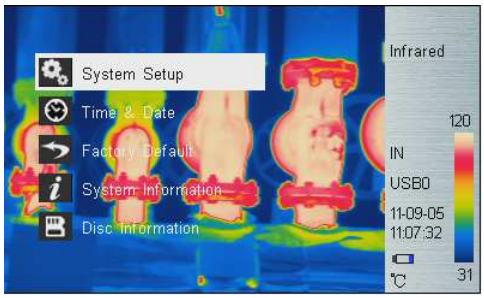
Press **Enter** button to clear all items at thermal image area.

L&S (Auto/Manual Mode)

Press **Enter** button to switch between auto and manual rectifying. In manual rectifying mode, upper-left corner of LCD display shows L&S, and press ❮ or ❯ to adjust upper temp limit and lower temp limit.

5.2.4 Setup

There are 5 items in Setup menu: System Setup, Time & Date, Factory Default, System Information and Disc Information.



Setup Sub-menu

There are 10 options in System Setup menu: **Language, Auto Rectify, Auto Save, Video, Transparence, Display Device, Screen Save, Power Save, USB, and Storage Medium**. Press ^ and v button to switch selection, press < and > button to adjust value, active item is highlighted with red background.

System Setup Sub-menu

Language

There are 11 different language options: Simplified Chinese, Traditional Chinese, English, Korean, Japanese, German, French, Russian, Italian, Portuguese and Spanish.

Auto Rectify

Set the number of seconds to perform next auto-rectify. Set value between 1 and 3000 seconds. Value 0 means disabling auto-rectify feature.

Auto Save

Set the number of seconds to perform next auto-save. Set value between 7 to 3600 seconds. Value 0 means disabling auto-save feature. Press < or > once to change the value by 1 second. Long press < or > will change the value in 10 intervals.

Video

Select between PAL and NTSC.

Transparence

Set to enable or disable menu transparence feature.

Display Device

Select between LCD display and external monitor device. Only one video output device can be selected at one time, the other one will be disabled.
🕮: If accidentally selected external monitor device and LCD display is disabled, power off and power on device to get LCD display back.

Screen Save

Set the number of minutes without operation to trigger disabling LCD display to save power. Select between 5min, 10min, 30min, and None.

Power Save

Set the number of minutes without operation to trigger power off completely. Select between 10min, 20min, 30min, and None.

USB

File Transmission and Video Transmission, press ❮ or ❯ button to switch options. If select File transmission, device is used as a U disk to export, delete, or format the data saved on the built-in FLASH or SD card to PC; If select Video, device is used to transmit the real-time video images to PC via IRSee software.
After set up ' IRSee Report ' Suite and USB device condition to video mode, the USB device can be used as a camera for infrared and visible light. For example, click the video connection key and after a while, the video conversation will be achieved via MSN, Skype, QQ etc. when the video source is only from Thermal Imaging Camera. If the sources are two or more, please choose 'TIUSB' among device names and the device names can pop up after pressed video connection key.

Storage Medium

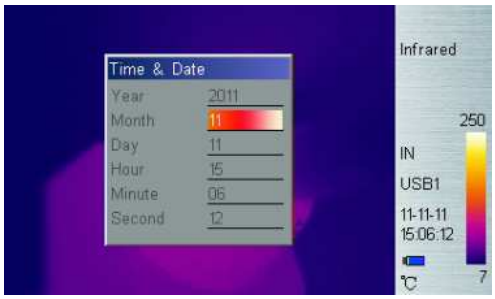
Storage Medium includes Internal and SD card, press ❮ or ❯ button to switch options. The capacity of Built-in FLASH is 256M, the capacity of

standard SD card is 2G, and the disk format is FAT.

🕮：*Device only identify FAT format SD card, not any other format .*

Time & Date

Set system date and time. Press ^ or v button to select an item, press < or > button to change its value and press **Enter** button to confirm. If Li-Ion battery is removed for a long time, it is necessary to reset system time and date.



Time Setting

Factory Default

Restore factory default and rectify some improper settings.

Parameters List of Default settings

Items	Parameters	Value/function
Measured Target	Spot 1、2、3、4	Disenabled
	area 1、2	Disenabled
	area 3	enabled
	Measuring line	None
Measurement Parameters	Emissivity	0.96
	Distance	1.5
	Humidity	60
	Correction factor	1.00
	Correction temperature	0.0°C
Image Settings	Alarm	Disenabled
	Alarm temperature	37.0°C
	Alarm color, isothermal color, etc.	Auto
	Isothermal temperature	37.0°C
	Isothermal height	1.0°C
	Thermal superposition type	Interval
	Fusion	Auto
	Dew point alarm	Disenabled
Analysis Settings	Temperature range	170/390:-20/100°C 175/395:-20/250°C
	Lens	11mm（170/175） 21.5mm（390/395）
	Temperature unit	°C
	Ambient temperature	Manual
	Reference measurement	Disenabled
	Reference temperature	30.0°C

Continued: Parameters List of Default settings

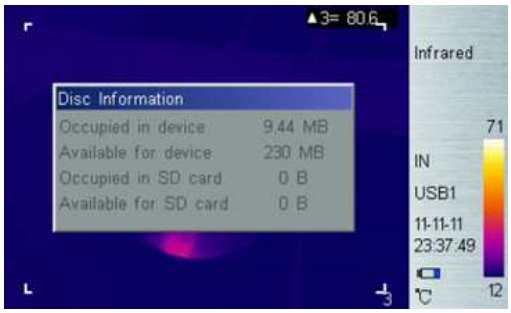
Items	Parameters	Value/function
System Settings	Languages	English
	Automatic correction	150S
	Automatic storage	0S
	Video format	PAL
	Menu Transparency	Enabled
	Display Mode	Screen
	Screen Auto-close	None
	USB	File transmission mode
	storage media	Flash
Time Settings	Time	No change

System Information

Select to display system information, such as: serial number, software version, and production date etc.

Disc Information

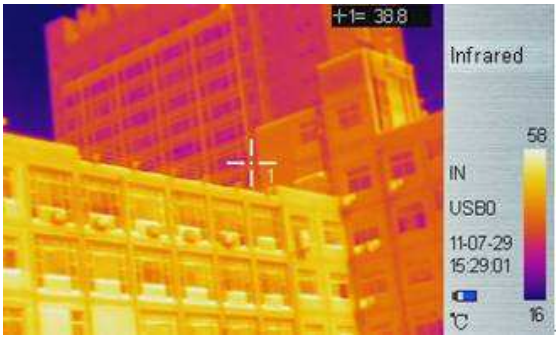
Select to display Disc Information as follows: the dialog box can indicate the FLASH's used disc space and free space, as well as used space, free space of SD card.



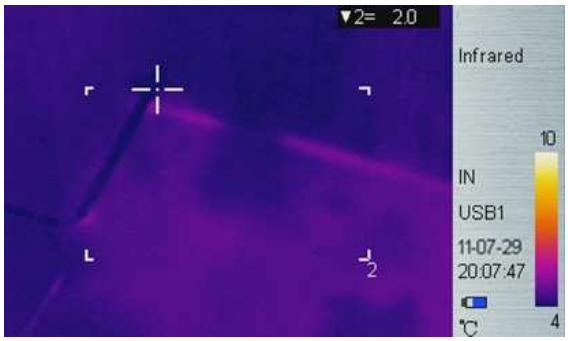
Disc Information

6. Building Thermal Imaging Summary

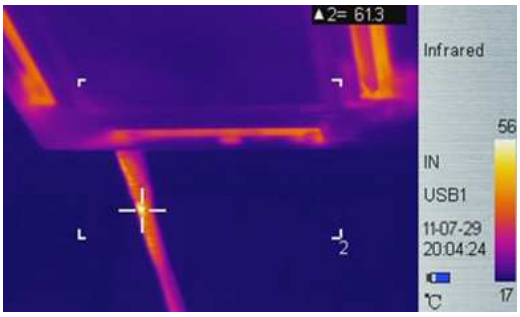
As the quality of life improves and the low-carbon life style becomes known, higher demands are being set on buildings. The features of our TI series IR camera make it possible to detect slight temperature difference and to analyze indoor humidity and leakage. Hereinafter are images in some cases.



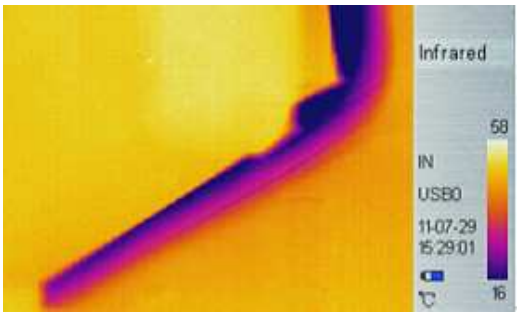
The effect drawing of building detection



The effect drawing of indoor humidity



The effect drawing of indoor pipe heat leakage



The effect drawing of indoor corner air leakage

7. Technical Specifications

Continued：Technical specifications

IR Detector	Type	New UFPA micro-bolometer	
	Resolution	170/175	160×120
		390/395	384×288
	Pixel Spacing	25*μm*	
Image Quality	Standard Lens	170/175	21°×16°0.1 *m*
		390/395	21°×16°0.4 *m*
	Optional Lens	170/175	Wide-angle ： 42°×32°0.1 *m* Telelens ： 10°×8°1 *m*
		390/395	Wide-angle ： 38°×28° 0.3 *m* Telelens ： 11°×8.5°1.2 *m*
	Spatial Resolution	170/175	2.3*mrad*
		390/395	1.2*mrad*
	Thermal Sensitivity	170/175	0.05□, 30□
		390/395	0.065□, 30□
	Frame-frequency	50/60Hz	
	Focusing	Auto/Motor	
	Digital Zoom	170/175	0.1 continuous stepping zoom within 1-4 multiples
		390/395	0.1 continuous stepping zoom within 1-8 multiples
	Spectral Range	8～14*μm*	
	visible camera	2Mpixel	
	spotlight	YES	
Display	display	3.5" Color 270°tiltable LCD	
	Image modes	Thermal、visual、thermal fusion、picture-in-picture、thumbnail gallery	
Measure	Temperature Range	170/390	-20 ^{O}C～+100 ^{O}C
		175/395	-20 ^{O}C～+250 ^{O}C (Standard) +200 ^{O}C～+600 ^{O}C（Optional A） +200 ^{O}C～+1200 ^{O}C（Optional B）
	Accuracy	±2 ^{O}C or ±2%(reading range), select the bigger value	
	Measure rectification	Auto/Manual	
	Measure Mode	4 spots, 3 areas available under real time mode(max, min and average temp) line measure, isothermal display, temp difference measure and temp alarm (sound/color)	

Measure	Color Palette	12 Colors selectable (including iron red, rainbow, black-white, and white-black etc.)	
	Image Setup	Auto/Manual adjust contrast, brightness	
	System Setup	Date, Time, Temperature Unit ℃/℉/K 10 Languages available, namely: Chinese (simplified & traditional), English, Italian, Japanese, Russian, French, German, Korean, Spanish and Portuguese.	
	Emissivity Rectification	Adjustable from 0.01 to 1.0	
	Ambient Temp Rectification	Auto, according to background temperature input	
	Atmospheric Trans Correction	Auto, according to distance, relative humidity, ambient temperature input	
	Dew point alarm	Available only for 170 and 390	
Storage	Storage Media (Built-in Memory)	175	Up to over 700 images
		395	Up to over 500 images
	2G Micro SD	175	Up to over 5600 images
		395	Up to over 4000 images
	Storage Mode	Auto/Manual single frame image storage	
	File Type	JPEG, with 14 bits measure data	
	Voice Annotation	40 Seconds voice recording per image (built-in microphone)	
USB	USB	File download, video transmission	
Laser	Director	Class 2, 1mW/635*nm* Red	
Power Supply	Battery Type	Rechargeable Li-Ion Battery	
	Battery Operating Time	3 Hours (Under normal temperature)	
	Charging type	Intelligent charger	
	Power Save	Included	
	External Power	5V±5% DC	
Operating Condition	Operation Temperature	-20℃~ +50℃	
	Storage Temperature	-40℃~ +60℃	

	Humidity	≤90% (non condensing)
	Protection Grade	IP50
Physical	Weight	480g
	Size(L×W×H)	128×62×154mm

8. Technical Support

For common mistakes and issues during operation, please refer the following form. If issue cannot be resolved, please contact our technical support department.

For simple problems arising during operation, please refer to the following table. If the problem cannot be settled, please cut off the power and contact our technical department.

Problem	Cause and Solution
Camera cannot be powered on	● No battery or batteries are not installed correctly → Install battery correctly. ● Battery power is used up. → Change battery or recharge. ● Save power mode →power on after 5 seconds.
Device power off automatically	● Battery power is used up. → Change battery.
Battery power is soon used up	● Ambient temperature is too high or low. ● Battery is not fully charged. → recharge battery fully. ● Battery may already reach end of life. (300 usage cycles) → use new battery to charge.
No thermal image	● Lens lid is closed. → Remove lens lid.
Thermal image is black and white	● Black & white palette may be selected. →restore factory default.

Failures	Causes and Solutions
The infrared camera can not start □	● The battery is uninstalled or improperly installed ➔ Insert the battery; or re-install the battery. ● The battery runs out ➔ Replace or charge the battery. ● infrared camera auto- shutdown ➔ Wait 5 seconds and then restart.
The infrared camera shuts down automatically	● The battery runs out ➔ Replace the battery.
Battery power runs out fast	● Ambient temperature is too low or too high. ● The rechargeable battery is not fully charged ➔ Recharge the rechargeable battery. ● The life of battery is almost over, about 300 cycles of charge and discharge for the type of battery ➔ Replace rechargeable battery
no thermal image displayed	● Lens cap is not open → open the lens cap.
thermal image turns black & white	● Check if black and white color code is selected → reload default settings.

9. Appendix: Emissivity of Raw Material

（For reference purpose only）

Material	Surface	Temp (^{O}C)	Emissivity (ε)
Aluminum	inoxidized	100	0.20
	Oxidized	100	0.55
Brass	Brown polished	20	0.40
	Unpolished	38	0.22
	Oxidized	100	0.61
Copper	Oxidized badly	20	0.78
Iron	Oxidized	100	0.74
	Rusted	25	0.65
Cast Iron	Oxidized	200	0.64
	inoxidized	100	0.21
Wrought Iron	Rough	25	0.94
	Polished	38	0.28
Nickel	Oxidized	200	0.37
Stainless Steel	Oxidized	60	0.85
Steel	800□ Oxidized	200	0.79
Brick	--	20	0.93
Concrete	--	20	0.92
Glass	Smooth flat	20	0.94
Lacquer	White	100	0.92
	Natural Black	100	0.97
Carbon	Smoky black	25	0.95
	Candle smoke	20	0.95
	Black-lead rough	20	0.98
Paint	16 Color average	100	0.94
Paper	White	20	0.93
Soil	--	20	0.90
Wood	Polished	30	0.90
Water	--	30	0.96
Skin	Human	32	0.98
China	Fine	21	0.90
	Rough	21	0.93

Uncooled Focal Plane Infrared Cameras

IRSee Report Software

User Manual

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Disclaimer

1. Limited Liability

Software does not guarantee the quality, performance or applicability of any hidden special purpose.
The contents of this manual will be updated because of device upgrade or other various reasons. Our company reserves the right to edit this manual without further notice.

2. Quality Assurance

The quality administration system of this product during the process of R&D and production has been approved in accordance with ISO9001 standard.

3. Compatibility with Previous Versions

This IRSee Software version supports all file and data created by any IRSee Software version.

4. Compatibility with Infrared Camera

This Software supports all JPEG format image recorded by Infrared Camera.

Ⅰ. Software Installation

Welcome to Use IRSee software.

1. Introduction

The IRSee Report version has a friendly user interface, 4 methods for measure analysis, and the function to save analysis report in Word, PDF, Excel and other formats.

2. System Requirements

The files of the IRSee software consist of IR image, visual image and graphic file, all of which are far bigger than normal text files, thus the following standards of the computer hardware configuration should be met:

2.1 Hardware Requirements

- CPU PENTIUM ® Dual-Core 2.0GHz processor or faster.
- 1Gbytes or more system memory.
- 20G or bigger hard disk.
- 1440×900 or higher resolution screen.

2.2 Operating System

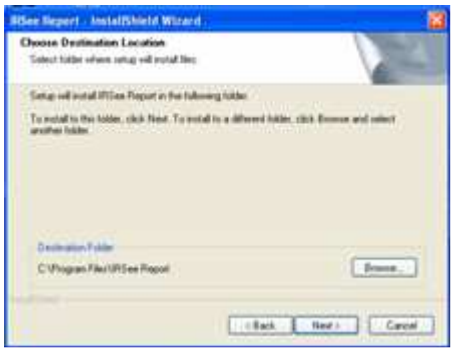
IRSee Software is compatible with Microsoft Windows 2000, XP, Vista, Windows 7. It provides a multi-language version for users.

3. Software Installation

The instructions of IRSee software installation and necessary precautions before using this software will be given in detail hereinafter:
Please follow the instructions when installing IRSee software application. Place software CD-ROM into CD drive, and run setup.exe in the CD root directory.
The default route is C:\Program Files\IRSee Report. You can change directory when installing.
Note: users who are operating Vista please close user account control to prevent warning

Step A: Running the Setup.exe, access the software installation.

Step B:Click the Next button, the system indicates the installation path, please adjust or change as needed.



Step C: Click the Next button continuously until the software installation is completed. The system will enter the encoder installation automatically.

Step D: Click and follow the default installation settings until the installation is completed.

Setup - ffdshow
Completing the ffdshow Setup Wizard
Setup has finished installing ffdshow on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Run audio decoder configuration
Run video decoder configuration
Run DXVA video decoder configuration
Run VFW configuration
Finish

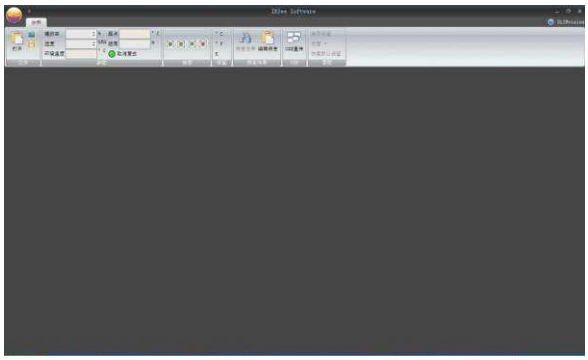
4. Uninstall Software

Please select the “Delete” button if want to reinstall the software.

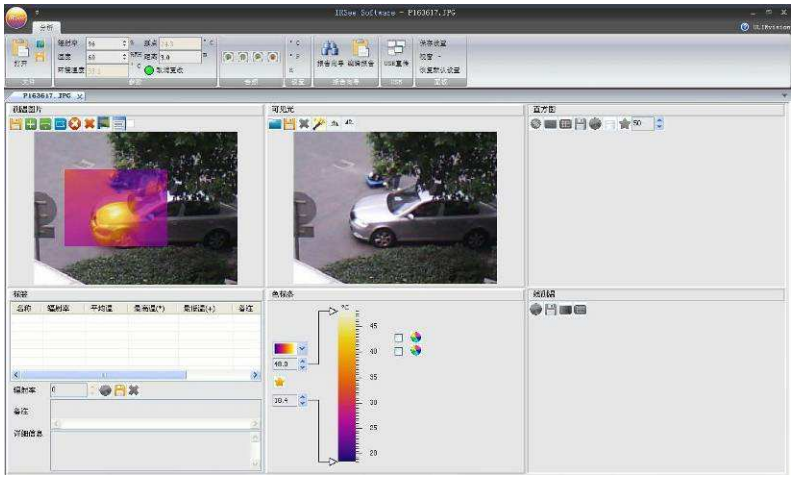
5. Starting-up Software

The following icon appears on Windows desktop after installing IRSee software.

Double-click the icon and startup IRSee interface.



Open an image by menu: open or icon in the ribbon.



Note: IRSee software has 10 different working languages, namely: Chinese (simplified & traditional), English, Italian, Japanese, Russian, French, German, Korean, Spanish and Portuguese. IRSee software has auto-recognition language function with the operating system in PC, the IRSee will be in English version the operating system is beyond mentioned languages in PC.

Ⅱ. Function Description

Image Import and Export

1.1 Image Import

◆Method 1:

- Click the software icon on upper left corner to pop up the menu.
- Click the Open button (also available to select a recently opened image path in the image bar) to pop up the file selection dialog box.
- Select a file in the file selection dialog box (single or multiple selections available).

◆Method 2:

- Click the “Open” button in the ribbon.

1.2 Image Export

It is available to export in accordance with the following methods after importing images:

◆ Method 1:

- Click the “Save As” button on the software icon on the upper left corner to pop up a file selection dialog box.
- Select / a file path and save the image in the current active window.

◆Method 2:

- Click the property analysis in toolbar.
- Click the Save As button to pop up a file selection dialog box.
- Select / a file path and save the image in the current active window.

◆Method 3:

- Click the software icon on the top left corner.
- Click the Save button to save the modified image on the current active window.

◆Method 4:

- Click the property analysis in Ribbon.
- Click the Save button to save the modified image on the current active window.

2. Modules

As displayed on the software interface, the software has the follows: the Quick Access Toolbar, Ribbon, Measuring Temperature Zone, Histogram Area, Line Profile Measurement Area, Color Code Area, Label Area, and Visible Area.

2.1 Quick Access Toolbar

Operate the Quick Access Toolbar to customize the buttons in the Ribbon and the file system, the buttons' function is consistent with the buttons shown in corresponding areas.

2.1.1 Customizing the Quick Access Toolbar

- Right-click the Ribbon to pop up a menu.
- Click the Customize Quick Access Toolbar to pop up customizing dialog box.
- Select the area name in the command drop-down box.
- Select your required buttons from the left box and create to the right box.
- It is also available to remove buttons on the right editing box.

2.1.2 Customizing Buttons

- Right-click the Ribbon to pop up a menu.

- Left-click Click the Customize Quick Access Toolbar to pop up the customizing dialog box.
- Left-click the Customize button to pop up the Customize Keyboard dialog box.
- Select a type on the upper left type edit box.
- Select a button on the upper right command edit box.
- Set the button shortcuts in the following two Edit Boxes and drop-down menu.
- Press the Assign button to save the settings.

2.1.3 Position Adjustment of Quick Access Toolbar

- Right-click the Ribbon to pop up a menu.
- Left-click the Ribbon / Quick Access Toolbar Below, and adjust its position.

2.2 Ribbon

The Ribbon is composed of File, Parameters, Audio, Temperature Type Settings, Report Wizard, USB and Panel.
The property analysis interface consists of File, Color, Parameter, Audio, and Settings, as shown below:

2.2.1 File

2.2.1.1 Open

- Click the File button to pop up a file selection dialog box.
- Select and open a file to be analyzed in the dialog box.

2.2.1.2 Save

◆ Method 1:

- Click the Save As button to pop up a file selection dialog box.
- Set / select the file path name where the file is saved.
- Save the image in the current active window.

◆ Method 2:

- Click the File and select the "Save All" button to save all the modified images.

2.2.2 Set

2.2.2.1 Emissivity adjustment

◆ Method 1:

- Please input a required emissivity value (1-100) in the Emissivity edit box.
- Press the Enter key to confirm it.

◆ Method 2:

- Click the Up and Down keys in the edit box to adjust and set an emissivity value.

2.2.2.2 Humidity Adjustment

●Please input a required humidity value (1-100) in the humidity edit box.
●Press the Enter key to confirm.

2.2.2.3 Distance Adjustment

●Please input a required distance value (1-100, unit: meter) in the distance edit box.
●Press the Enter key to confirm.

2.2.2.4 Ambient Temperature

Select the option to show the actual ambient temperature while the thermal image is being shot.

2.2.2.5 Dew Point Temperature

Select the option to show the dew point temperature.

2.2.2.6 Cancel Changes

Click the “Cancel Changes” button to recover the emissivity, humidity, ambient temperature, or distance to its original state.

2.2.3 Audio

The buttons in audio area are available for the measured image consisting of audio information only.
Operate the option to play back the audio saved in images.

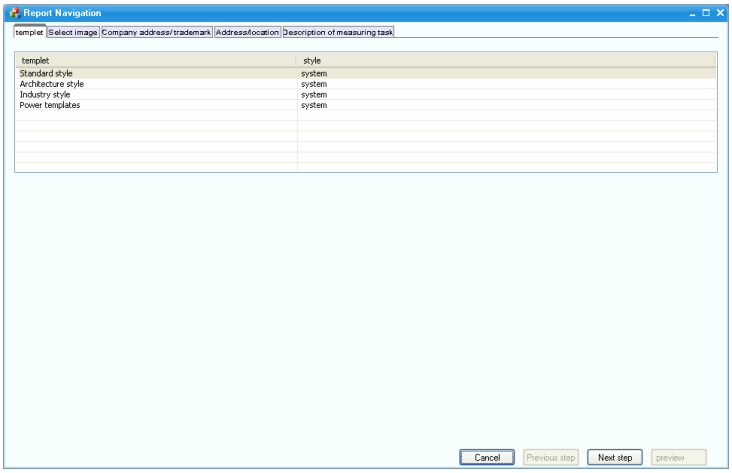
2.2.4 Set Temperature Type

This option is used to set the temperature display unit, click ℃, ℉ or K to set the temperature unit to Celsius, Fahrenheit or Kelvin respectively.

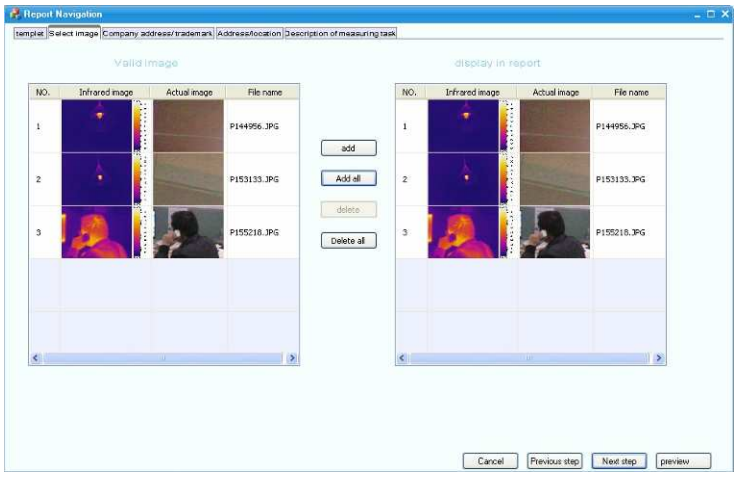
2.2.5 Report Wizard

2.2.5.1 Report Wizard

Report Wizard is used for creating a report, the Report Edit is mainly used for editing a report for further analyze.
Click the Report Wizard to select the type of exported report as needed.



Click Next to select an image or multiple images.



Fill in related information in accordance with different types of report templates ->> Preview

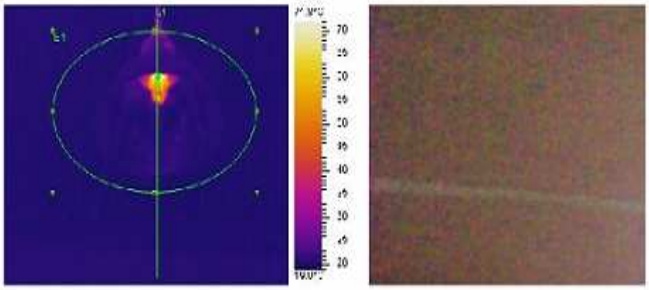
Inspection Report

Company	Client
Address	Address
Tel/Fax	Tel/Fax
E-mail	E-mail
Contact	Contact

Device name	Device mode
Device series	Lens

Measuring object name
Position of measuring point
Measurement task

NO.	File:	Date:	Measuring Time:
1	P144956.JPG	2011-11-13	14-49-57

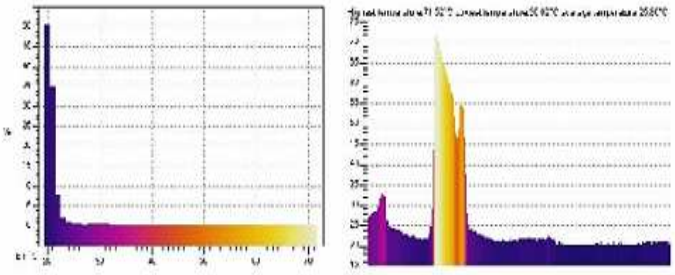


Emissivity 0.96

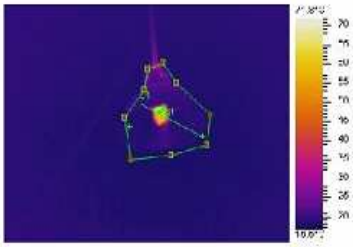
Remark

Tag	Emissivity	Min. Temp.	Aver.Temp.	Max.Temp.	Remark
L1	-	20.02°C	25.80°C	71.52°C	
E1	0.96	19.43°C	21.78°C	71.78°C	

Histogram **Profile line**



NO.	File:	Date:	Measuring Time:
2	P153133.JPG	2011-11-14	15-31-33

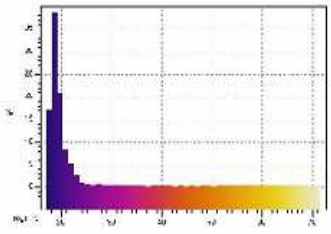


Emissivity 0.96

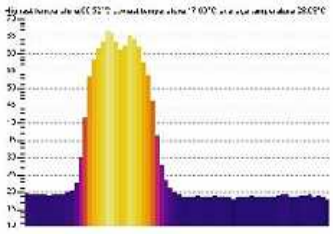
Remark

Tag	Emissivity	Min. Temp.	Aver.Temp.	Max.Temp.	Remark
L1	-	17.60°C	28.63°C	66.52°C	
Rg1	0.96	17.06°C	21.16°C	71.80°C	

Histogram

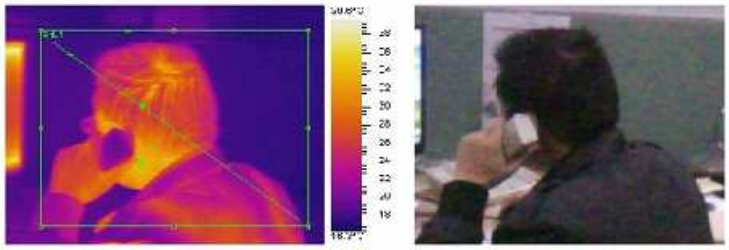


Profile line



Remark

NO.	File:	Date:	Measuring Time:
3	P155218.JPG	2011-11-22	15-52-18

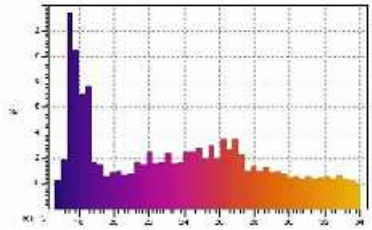


Emissivity 0.96

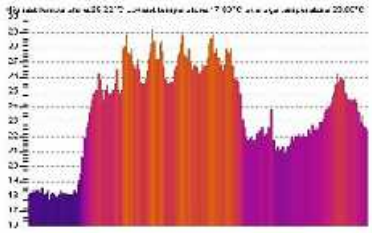
Remark

Tag	Emissivity	Min. Temp.	Aver.Temp.	Max.Temp.	Remark
L1	-	17.80°C	23.80°C	29.22°C	
R1	0.96	16.63°C	18.39°C	34.12°C	

Histogram



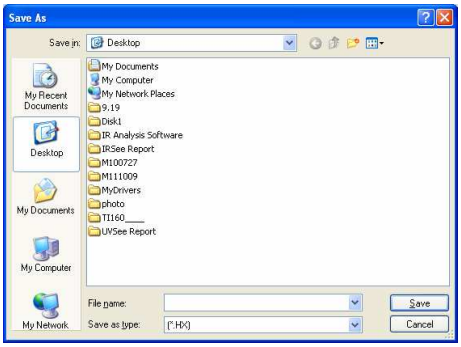
Profile line



2.2.5.2 Edit Report

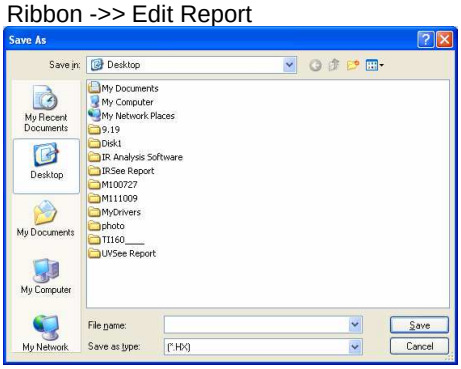
If a report is to be closed, the system will prompt whether to save the report or not.

Click the OK button.



Input and select the saving path and file name, and then click the Save button.

Click the report in Ribbon ->> Edit Report

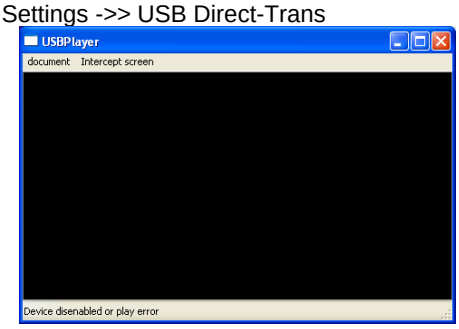


Select a saved report to reopen and edit it.

2.2.6 USB Direct-Transmission

2.2.6.1 Connection

Click the Ribbon Settings ->> USB Direct-Trans



Connect a device, set to USB Direct-Trans mode for the device.
Click the device iron on PC software interface ->> Open the device ->> Play

2.2.6.2 Video

Click the device ->> Record

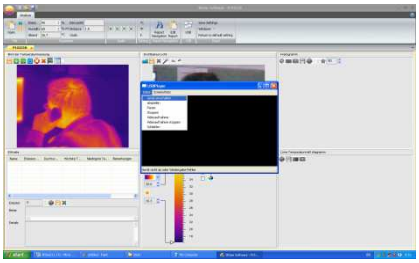
Select a video path ->> Input the name of the video file.

2.2.6.3 Stop the video

Click File ->> Stop Recording

2.2.6.4 Pause, Stop and Close Direct-trans

Click the Pause, Stop and Close buttons under the File menu respectively to stop the current operation.



2.2.6.5 Print Screen

Click the Print Screen button and save the printed image into the Picture folder under the installation directory, and name it by a time format.

2.2.7 Panel

It is mainly used for showing/ hiding each area, a user can adjust the size and position of each display area as needed, and then click the “Save Settings” to save the current settings, and click the “Reload Default Settings” to recover.

2.3 Measuring Temperature Zone

The functional options in measuring area are shown below:

- The measurement objects can analyze the thermal images by the following three kinds of analysis methods: point, line, and area.

- Line measurement analysis has three: arbitrary line, horizontal line, vertical line, and multiple-line analysis is also available.
- Area measurement analysis has below: rectangular, elliptical and polygonal analysis.
- The system can analyze up to 20 spots objects, a line analysis object, 20 area analysis objects, 10 polygonal objects and 10 elliptical objects simultaneously.

2.3.1 Select Measured Objects

The prior sequence of object selection is point, line, and area.

- When two or more objects are simultaneously selected, the system can operate in accordance with the above prioritization.
  e.g.: if both a point object and a line object are simultaneously selected, the point is more prior than line, the point object will be prior selected;
  If both an area object and a line object are simultaneously selected, the line is more prior than the area; the line object will be prior selected.

- If two or more areas are simultaneously selected, the smaller area will prevail.
  e.g.: If Rectangle 1 and Rectangle 2 are simultaneously selected, Rectangle 1 is smaller than Rectangle 2, Rectangle 1 will prevail.

2.3.2 Point Analysis

Create a point

- Click the Create button
- Move the mouse to a point to be analyzed, and click it.

Move a point

- Move the mouse to a point to be moved.

- When the mouse status changes to , left-click to select the point.
- Move the mouse.

Delete a point

- Select a measurement point to be deleted.
- Click the button to delete the current measured object.

2.3.3 Line Analysis

Create a line

- Arbitrary line
  - Click the Create button to pop-up a menu.
  - Click the Arbitrary Line button.
  - Set a starting point of the line in the thermal image to be analyzed.
  - Left-hold and drag the mouse to the terminal point of the line.
- Vertical Line
  - Click the Create button to pop-up a menu.
  - Click the Vertical Line button.
  - Set the vertical coordinates of starting point of the line in the thermal image to be analyzed.
  - Left-hold and drag the mouse to the vertical coordinates of terminal point of the line.
- Horizontal Line
  - Click the Create button to pop-up a menu.
  - Click the Horizontal Line button.
  - Set the horizontal coordinates of starting point of the line in the thermal image to be analyzed.

- Left-hold and drag the mouse to the horizontal coordinates of terminal point of the line.

Move and change a line

- Move
  - Move the mouse to the position of a line to be moved.
  - When the state of mouse becomes , left-click to select it.
  - And then move it.
- Change the positions of starting point / terminal point
  - Move the mouse to the position of the line to be moved.
  - When the state of mouse becomes , left-click to select the line.
  - Move the mouse to the position of starting point / terminal point to be moved.
  - When the state of mouse becomes , left-click to select starting point / terminal point.
  - Drag the mouse to the required position of starting point / terminal point.

Delete a line

- Select the line measurement object to be deleted.
- Click the button to delete the current temperature measurement object.

2.3.4 Area Analysis

It has three areas: rectangle, polygon, and ellipse.

Create a rectangle

- Click the Create Area button to pop up a menu.

- Click the Rectangle.
- Select the starting point of the rectangle in the thermal image to be analyzed.
- Drag the mouse to create a rectangular analysis area.

Move and Drag a Rectangle

- Move
  - Move the mouse into the rectangle target area.
  - When the state of mouse becomes , click to select it.
  - Move the mouse.
- Zoom in / out
  - Move the mouse into the rectangle to be modified.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to the eight vertexes of the rectangle.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to change the size of the rectangle.

Delete a rectangle

- Select the rectangle object to be deleted.
- Click the button to delete the current temperature measurement object.

Create a polygon

- Click the Create Polygon to pop-up a menu.
- Click the Polygon.
- Select the starting point of the polygon in the thermal image to be analyzed.
- Move the mouse and left-click to add other vertices of polygon.

- Right-click to stop adding the vertexes to create a polygon.
- If the number of vertexes is equal to or more than 50, the system can stop adding automatically.

Move and Drag a Polygon

- Move
  - Move the mouse into the polygon to be analyzed.
  - When the state of mouse becomes , click to select it.
  - Move the mouse.
- Zoom in / out
  - Move the mouse into the polygon to be modified.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to a vertex to be modified.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to change the position of the vertex, thus to modify the polygon.

Delete a Polygon

- Select the polygon to be deleted.
- Click the button to delete the current temperature measurement object.

Add an ellipse

- Click the Add Area button to pop-up a menu.
- Click the Ellipse .
- Select the starting point of the ellipse in the thermal image to be analyzed.
- Drag the mouse to create an elliptical analysis area.

Move and Drag an Ellipse

- Move
  - Move the mouse into the ellipse to be moved.
  - When the state of mouse becomes , click to select it.
  - Move the mouse.
- Zoom in / out
  - Move the mouse into the ellipse to be modified.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to the eight vertexes.
  - When the state of mouse becomes , click to select it.
  - Move the mouse to change the size of the ellipse.

Delete an ellipse

- Select the ellipse to be deleted.
- Click the button to delete the current temperature measurement object.

2.3.5 Save Images

Click the Save Images button to pop up the file selection dialog box.

Select image formats

- Select / set the file path.
- Click the Save button to save the image (the image does not contain any measured temperature data, and is unavailable to be analyzed by software).

2.3.6 Clear measured objects

Click the Clear Measured Objects button to clear all point, line, area analysis of measured targets.

2.3.7 Fusion / Infrared

Click the button to switch between the fusion and infrared modes.

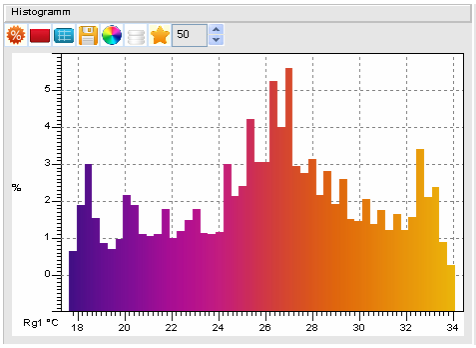
2.3.8 Export Temperature Data

Click the button to export all the points' temperature in the whole thermal image to TXT file, the temperature unit is Celsius.

2.3.9 Audio

The option is an audio option under Temperature image module, the selected iron indicates the image consists of playable audio, the unselected iron indicates the image doesn't consist of any playable audio.

2.4 Histogram Area



2.4.1 Relative / absolute Scale

If the relative scale is selected, the vertical axis represents the percentage of the number of measured points; if the absolute scale is selected, the

vertical axis represents the actual number of corresponding measured points. It is available to click the button to switch.

2.4.2 Gradient / Solid Color Display

If the gradient histogram display mode is enabled, the system can automatically select corresponding color to fill the histogram in accordance with the temperature; If the solid color display mode is enabled, the system will fill histogram with red. it is available to click the button to switch.

2.4.3 Enable /Disenable Grid

If the grid is enabled, it is available to draw grid dashed lines on the histogram background; if disenabled, it's unavailable to draw. it is available to click the button to switch.

2.4.4 Save a Histogram

- Click the Save Images button to pop up the file selection dialog box.
- Select the image format.
- Check / set the path to save the image.
- Click the Save button to save the current histogram.

2.4.5 Set the Background Color

- Click the Background Color button to pop-up color selection dialog box.
- Select a background color.
- Click the OK button to confirm the background color.

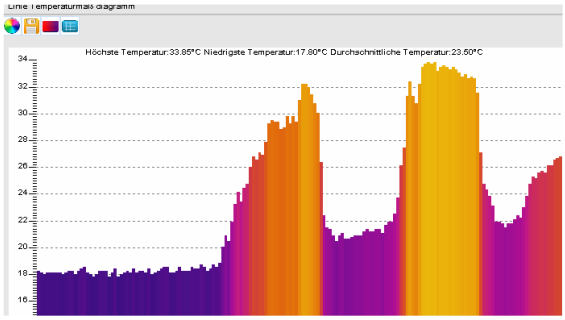
2.4.6 Show / Hide the Out-of-Range Column

Click the button to show or hide any column out of temperature range of color code bar, composed of points.

2.4.7 Reset

Click the Reset button to reload the default state to the histogram.

2.5 Line Profile Measurement Area



2.5.1 Show /hide grid lines

Click the Grid button to switch the grid display and hide mode.

2.5.2 Set the background color

- Click the background color button to pop-up color selection dialog box.
- Select a background color.
- Click the OK button to confirm the background color.

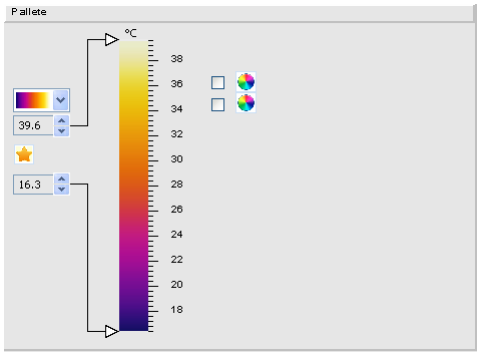
2.5.3 Save the line profile measurement image

- Click the button to pop up the file selection dialog box.
- Select an image format.
- Check / set the path to save the image.
- Click the Save button to save the line profile measurement image.

2.5.4 Settings

Click the button to select the line profile as customized.

2.6 Color Code Area



It is available to adjust the type of color code, 12 kinds of color bars are available. A User can also adjust the maximum or minimum temperature, and isothermal upper and lower limits, any out-of-range temperature can not be supported. If the dew point is selected, the corresponding color code of below the dew point temperature will be unified.

2.6.1 Default maximum or minimum temperature and upper and lower limits of isothermal color

Click the button to reload default settings.

2.6.2 Adjust upper and lower temperature

- Method 1:
  - Move the mouse to the upper and lower temperature on left side of the color bar ;
  - When the mouse's status turns , please left-click to select;
  - Drag the mouse to the required temperature value position.
- Method 2:
  - Click the scroll bar on the arrow button to adjust upper and lower temperature (each step is 0.1)

2.6.3 Adjust upper and lower limits of isothermal color,

If the isothermal color is enabled, a user can adjust the isothermal scope

- Method 1:
  - Move the mouse to the upper and lower temperature on right side of the color bar.
  - When the mouse's status turns , please left-click to select.
  - Drag the mouse to the required temperature value position.

- Method 2:
  - Click the scroll bar on the arrow button to adjust upper and lower limits (each step is 0.1).

2.6.4 Select a dew point

When a dew point is selected, all points which temperature is below the dew point will be colored in uniform.

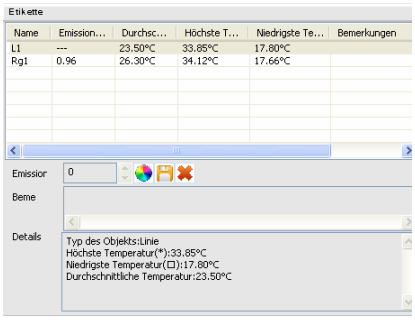
2.6.5 Set isothermal color and dew point color

The default isothermal color is fluorescent green, the default dew point color is blue, and the dew point is prior selected.

- Click the Set Color button, to pop up the color selection dialog box.
- Select / customize the background color.
- Click the OK button to confirm the selected color.

2.7 Label Area

The Label Area indicates detailed information of measured objects, when the measured object changes, the object's label will change accordingly, the structure of label area is as below:



2.7.1 Set the color of measured object

- Select a measured object in the label list.
- Click the button to set a color for currently selected object.
- Select / customize a color.
- Click the OK button to conform the color of measured object.

2.7.2 Add remarks for measured object

- Select a measured object in the label list.
- Add Remarks in the Remarks edit box (0-512 characters available).
- Click the Upload Current Settings button to add remarks.

2.7.3 Change emissivity of measured object

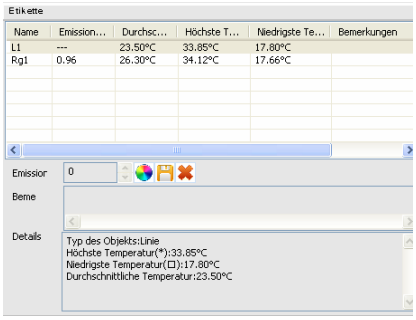
- Select a measured object in the label list.
- Adjust the scroll bar of emissivity.

2.7.4 Remove a measured object

- Select a measured object in the label list.
- Click the button to delete the currently selected object.

2.7.5 Add detailed Information in Image remarks

If any object in the label is not selected, it is available to input information.



2.8 Visible Light

2.8.1 Open an Image

This feature is available for any image that without visible light.

- Click the Open button to pop up the file selection dialog box.
- Select a file to be added from the dialog box.

2.8.2 Save an image

- Click the Save button to pop up the file selection dialog box.
- Select an image format.
- Check / set the path where the image is saved.
- Save the visible light image.

2.8.3 Delete an image

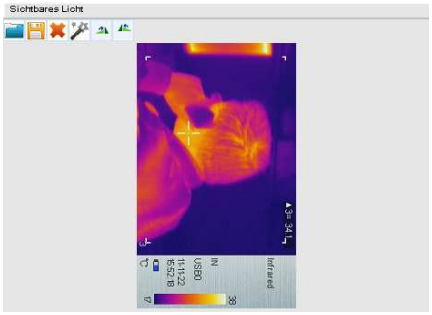
This feature is available for any image that without visible light.

Click the Delete button to delete the currently added visible image.

2.8.4 Flip an image

This feature is available for any image that without visible light.

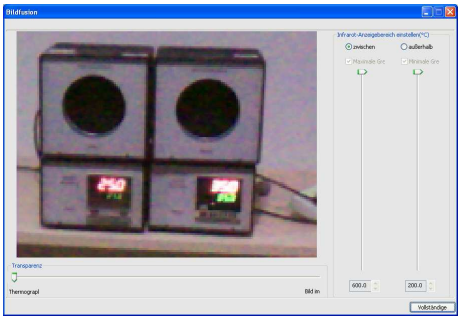
Click the or button to flip an image clockwise or counterclockwise.



2.8.5 Fusion

This feature is available for any image that with visible light.

Click the button to set an image.

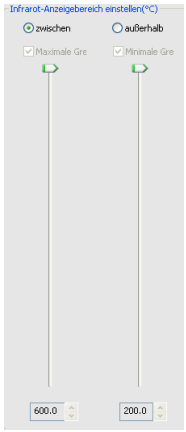


- Set the transparency

Drag the lower left progress bar to adjust the fusion values between infrared image and visible image.

- Set infrared display range

Drag the right two progress bars to adjust the infrared display range of interval or above upper or below lower limit.



Click the “OK” button to save the file, the updated image is displayed on the measurement area.